

CLAIMS

WE CLAIM:

1. A product separation and selection tray system for a vending machine, said product separation and selection tray system comprising

a tray for holding two columns of product to be mounted on a shelf in the vending machine,

a central wall for separating the two columns of product on opposite sides of the wall,

a rotator pivotally mounted on the tray for controlling release of a product from the tray,

a gate pivotally mounted on the tray for restraining a successive product located behind the product released by the rotator, and

a lever projecting from the tray for engagement by a product acquisition device, said lever controlling simultaneous movement of the rotator and the gate for dispersing product from the tray to the product acquisition device.

2. The product separation and selection tray system as claimed in claim 1, wherein the rotator includes two flat side surfaces interconnected by a curved side surface, the curved surface is movable into and out of a path of product moving along the tray.

3. The product separation and selection tray system as claimed in claim 1, wherein the gate is located in the central wall.

4. The product separation and selection tray system as claimed in claim 1, wherein two sidewalls mounted on the tray are located on opposite sides of the central wall.

5. The product separation and selection tray system as claimed in claim 4, wherein the two sidewalls are laterally adjustable towards and away from the central wall so as to accommodate different sized products.

6. The product separation and selection tray system as claimed in claim 1, wherein a push bar slides on the tray to move product along the tray towards the lever.

7. The product separation and selection tray system as claimed in claim 6, wherein a spring biases the push bar.

8. The product separation and selection tray system as claimed in claim 7, wherein there are two push bars.

9. The product separation and selection tray system as claimed in claim 1, wherein the lever is movable with respect to the tray.

10. The product separation and selection tray system as claimed in claim 9, wherein the rotator and the gate are connected to the lever.

11. The product separation and selection tray system as claimed in claim 10, wherein the rotator and the gate are connected to the lever so that the rotator and the gate move in opposite directions when the lever is engaged by the product acquisition device.

12. The product separation and selection tray system as claimed in claim 1, wherein the rotator is located on the tray between an end of the lever and the gate.

13. The product separation and selection tray system as claimed in claim 1, wherein the gate includes two ends, one end of the gate is pivotally mounted on the tray and the other end of the gate is movable by the lever.

14. The product separation and selection tray system as claimed in claim 2, wherein the rotator is pivotally mounted on the tray at an intersection between the two flat surfaces with one of the flat surfaces moving in line with the central wall when the rotator is pivoted by movement of the lever.

15. The product separation and selection tray system as claimed in claim 1, wherein a support plate locates the lever underneath the tray and underneath the rotator and the gate.

16. A product acquisition and transport system for a vending machine, said product acquisition and transport system comprising

an elevator cup for receipt of product from a product separation and selection tray system of the vending machine,

a rail guiding horizontal movement of the elevator cup,

a first drive assembly for moving the elevator cup horizontally, said first drive assembly including a first drive motor fixed in location with respect to the vending machine and a first tension element driven by the first drive motor, the first tension element being connected to the elevator cup for moving the elevator cup laterally along a horizontal axis, and

a second drive assembly for moving the rail vertically, the second drive assembly including a second drive motor fixed in location with respect to the vending machine and a second tension element driven by the second drive motor, the second tension element being connected to the rail for moving the rail vertically along a vertical axis so that the elevator cup is moved horizontally with respect to the product to be dispensed in the vending machine by the first drive assembly and the elevator cup is moved vertically with respect to the product to be dispensed in the

vending machine when the rail is moved vertically by the second drive assembly.

17. The product acquisition and transport system as claimed in claim 16, wherein the elevator cup detects a presence of a dispensed product in the elevator cup.

18. The product acquisition and transport system as claimed in claim 17, wherein the elevator cup is open on one side.

19. The product acquisition and transport system as claimed in claim 16, wherein the first tension element and the second tension element are one of a belt, a chain and a cable.

20. The product acquisition and transport system as claimed in claim 16, wherein the rail is slidable along a vertical guide rail at each end of the rail.

21. The product acquisition and transport system as claimed in claim 16, wherein the elevator cup is pivotally mounted on the rail for release of product from the elevator cup to a delivery port.

22. The product acquisition and transport system as claimed in claim 21, wherein the elevator cup is pivotal to an angle of approximately 45°.

23. The product acquisition and transport system as claimed in claim 16, wherein the elevator cup includes a channel for receipt of a lever of a product separation and selection tray system.

24. The product acquisition and transport system as claimed in claim 16, wherein the first and the second drive assembly are located on a movable door of a vending machine.

25. The product acquisition and transport system as claimed in claim 24, wherein the movable door includes a clear panel for viewing of contents of the vending machine and viewing movement of the elevator cup and the rail.

26. The product acquisition and transport system as claimed in claim 24, wherein positioning of the elevator cup and the rail are controlled by an input to a keypad of the vending machine.

27. The product acquisition and transport system as claimed in claim 24, wherein a product compartment of the vending machine includes a plurality of removable product separation and selection tray systems.

28. The product acquisition and transport system as claimed in claim 27, wherein each of said removable product separation and selection tray systems includes

a tray for holding two columns of product to be mounted on a shelf in the vending machine,

a central wall for separating the two columns of product on opposite sides of the wall,

a rotator pivotally mounted on the tray for controlling release of a product from the tray,

a gate pivotally mounted on the tray for restraining a successive product located behind the product released by the rotator, and

a lever projecting from the tray for engagement by a product acquisition device, said lever controlling simultaneous movement of the rotator and the gate for dispersing product from the tray to the product acquisition device.

29. The product acquisition and transport system as claimed in claim 16, wherein said elevator cup includes an arcuate slot for guiding pivotal movement of said elevator cup.

30. The product acquisition and transport system as claimed in claim 16, wherein a portion of said elevator cup engages a port latch of a delivery door for opening of the delivery door during vertical movement of the elevator cup to expose a delivery window.

31. The product acquisition and transport system as claimed in claim 30, wherein said delivery door blocks access to the delivery window and a delivery box for receiving product dispensed from the elevator cup.

32. A controlled delivery of product system for delivery of product in a vending machine obtained by a product acquisition system, said controlled delivery of product system comprising
an elevator cup for receipt of product from a product selection system of the vending machine,
a delivery window covered by a delivery door for dispensing selected product, and
a transport system for moving the elevator cup from the product selection system to the delivery door,
said elevator cup being pivotally mounted for release of product through the delivery window upon opening of the delivery door.

33. The controlled delivery of product system as claimed in claim 32, wherein the elevator cup engages the delivery door for opening the delivery door by vertical movement of the elevator cup.

34. The controlled delivery of product system as claimed in claim 32, wherein a portion of the elevator cup engages a port latch of the delivery door for release and opening of the delivery

door during vertical movement of the elevator cup to expose the delivery window.

35. The controlled delivery of product system as claimed in claim 32, wherein a projecting tab of a wall of the vending machine is engaged by an upper wall portion of the elevator cup as the elevator cup is moved vertically to pivot the elevator cup for dispensing of product.

36. The controlled delivery of product system as claimed in claim 35, wherein the elevator cup is pivoted to an angle of approximately 45°.

37. The controlled delivery of product system as claimed in claim 35, wherein a portion of the elevator cup engages a port latch of the delivery door for release and opening of the delivery door during the vertical movement of the elevator cup to expose the delivery window.

38. The controlled delivery of product system as claimed in claim 37, wherein a portion of the port latch engages a portion of a delivery box to prevent movement of the delivery box during opening and closing of the delivery door.

39. The controlled delivery of product system as claimed in claim 38, wherein the portion of the delivery box engaged by the portion of the port latch is a pin.

40. The controlled delivery of product system as claimed in claim 38, wherein the delivery box is pivoted away from the vending machine after release by the portion of the port latch.

41. The controlled delivery of product system as claimed in claim 38, wherein an optical sensor indicates a position of the delivery box for receipt of product through the delivery window.

42. The controlled delivery of product system as claimed in claim 39, wherein the delivery box includes an arcuate slot engaging the pin for guiding tilting movement of the delivery box.